

**REMARKS**

Claims 1-22 were pending in this application.

Claims 1-22 have been rejected.

Claims 1, 6, 8, 12, 15, 19, and 21 have been amended as shown above.

Claim 23 has been added.

Claims 1-23 are now pending in this application.

Reconsideration and full allowance of Claims 1-23 are respectfully requested.

I. **REJECTION UNDER 35 U.S.C. § 101**

The Office Action rejects Claims 1-22 under 35 U.S.C. § 101 as being directed to non-statutory subject matter. In particular, the Office Action asserts that Claims 1, 8, 15, and 21 do not produce a “useful, concrete, and tangible result” because it is “unclear how the result is being stored, displayed, or used in any tangible manner.” (*Office Action, Page 2*).

The Official Gazette notice cited in the Office Action clearly states that the “tangible” requirement requires a process claim to set forth a “practical application” of a § 101 judicial exception to “produce a real-world result.” The Official Gazette notice also notes that a patent is granted for the discovery or invention of a practical method or means of producing a “beneficial result or effect.”

The claims as amended recite using “one or more defect indicators” to identify a “possible defect in [a] valve.” This clearly represents a “practical application” that produces a “real-world result” (unless the Patent Office takes the position that identifying defects in valves

is merely an abstract idea and not a practical application). This also represents a recitation that produces a “beneficial result or effect” (unless the Patent Office takes the position that identifying defects in valves is somehow not beneficial or useful).

Accordingly, the Applicants respectfully request withdrawal of the § 101 rejection.

## II. REJECTION UNDER 35 U.S.C. § 102

The Office Action rejects Claims 1-22 under 35 U.S.C. § 102(a) as being anticipated by Gao et al., “Wavelet-Based Pressure Analysis for Hydraulic Pump Health Diagnosis” (“*Gao*”). This rejection is respectfully traversed.

A prior art reference anticipates the claimed invention under 35 U.S.C. § 102 only if every element of a claimed invention is identically shown in that single reference, arranged as they are in the claims. (*MPEP* § 2131; *In re Bond*, 910 F.2d 831, 832, 15 U.S.P.Q.2d 1566, 1567 (*Fed. Cir. 1990*)). Anticipation is only shown where each and every limitation of the claimed invention is found in a single prior art reference. (*MPEP* § 2131; *In re Donohue*, 766 F.2d 531, 534, 226 U.S.P.Q. 619, 621 (*Fed. Cir. 1985*)).

The Office Action asserts that *Gao* discloses “decomposing a signal into a plurality of decomposed signals at a plurality of resolution levels (equation 9), and grouping/reassembling the decomposed signals at multiple resolution levels together and then using relationships between those composed signals to identify defect indicators.” (*Office Action, Page 7*).

The Office Action is partially correct – *Gao* clearly decomposes a signal into multiple decomposed signals at multiple resolution levels. The issue is whether *Gao* discloses the same

technique recited in the claims for using those decomposed signals.

*Gao* recites two different techniques for using wavelet coefficients. One technique involves decomposing a signal into sub-band signals and then reassembling the sub-band signals to form a reassembled signal. The reassembled signal is then compared to a “standard” wavelet. This allows a determination to be made as to whether a hydraulic pump is defective (but does not identify the type of fault if the pump is defective). (*Page 976, Left column, Last full paragraph*).

In this first technique, there is absolutely no attempt to generate any defect indicators for a particular “group” of “decomposed signals” using “relationships” between the “decomposed signals” in that “group.” Moreover, there is no “plurality of groups” in this technique, where each “group” includes “decomposed signals at multiple resolution levels.” The individual sub-band signals are used in this first technique only to generate the reconstructed signal, not to identify if a defect exists in the pump. As a result, there is only one possible grouping in this technique (the reconstructed signal and the standard wavelet). Also, there is no “plurality of groups” in this technique (where each “group” includes “decomposed signals at multiple resolution levels”). In addition, the reconstructed signal is clearly not a “decomposed” signal at one of multiple “resolution levels.” Rather, the reassembled signal simply represents a signal constructed using decomposed signals from multiple resolution levels. It is unclear whether the “standard wavelet” of *Gao* represents a “decomposed signal” at one of multiple resolution levels. In any event, even the single group of signals in *Gao* (the reconstructed signal and the standard wavelet) does not represent a group of “decomposed signals at multiple resolution levels” as recited in the claims.

The second technique in *Gao* is used to determine the type of fault in a hydraulic pump (if a fault is detected using the first technique). In this second technique, defects in a hydraulic pump are identified using the wavelet coefficients  $cd_i$  in a high-frequency set of sub-bands. For example, as shown in Figures 4-6 of *Gao*, the wavelet coefficients in Figure 4 remain between  $\pm 1$  (indicating the pump is operating normally), and the wavelet coefficients in Figures 5 and 6 exceed  $\pm 1$  (indicating the pump is faulty). As another example, the wavelet coefficients in the high-frequency sub-bands for a defective pump, when compared to the wavelet coefficients in the high-frequency sub-bands for a normal pump, exhibit a larger amplitude and possibly a harmonic pattern. (*Page 972, Right column – Page 973, Right column; Page 976, Left column, Last paragraph – Right column, First paragraph*).

In this second technique, the wavelet coefficients at one resolution level (such as  $cd_1$ ,  $cd_2$ , or  $cd_3$ ) for a faulty pump have a different range of amplitudes than the wavelet coefficients at the same resolution level for a normal pump. For a normal pump, the ranges of the wavelet coefficients include  $\pm 0.6$  for  $cd_1$ ,  $\pm 0.4$  for  $cd_2$ , and  $\pm 0.3$  for  $cd_3$ . For a faulty pump, the ranges of the wavelet coefficients include  $\pm 0.8$  or  $\pm 0.9$  for  $cd_1$ ,  $\pm 0.7$  or  $\pm 0.8$  for  $cd_2$ , and  $\pm 0.5$  or  $\pm 0.6$  for  $cd_3$ . (*Page 976, Left column, First paragraph*). Here, *Gao* is simply comparing the range of wavelet coefficients at a single resolution level to different threshold values.

Once again, there is no “grouping” of “decomposed signals” from multiple “resolution levels” into a single group in this second technique of *Gao*. Moreover, defect indicators are not determined for one “group” of “decomposed signals” using “relationships” between the “decomposed signals” in that “group.” *Gao* simply compares the range of values at each

resolution level to different thresholds. This involves absolutely no “grouping” of decomposed signals or the generation of defect indicators using “relationships” between decomposed signals in a group.

For these reasons, *Gao* fails to anticipate the Applicants’ invention as recited in Claims 1, 8, 15, and 21 (and their dependent claims). Accordingly, the Applicants respectfully request withdrawal of the § 102 rejection and full allowance of Claims 1-22.

### **III. NEW CLAIM**

The Applicants have added new Claim 23. The Applicants respectfully submit that no new matter has been added. At a minimum, the Applicants respectfully submit that Claim 23 is patentable for the reasons discussed above. The Applicants respectfully request entry and full allowance of Claim 23.

### **IV. CONCLUSION**

The Applicants respectfully assert that all pending claims in this application are in condition for allowance and respectfully request full allowance of the claims.

**SUMMARY**

If any issues arise, or if the Examiner has any suggestions for expediting allowance of this application, the Applicants respectfully invite the Examiner to contact the undersigned at the telephone number indicated below or at *wmunck@munckbutrus.com*.

The Applicant has included the appropriate fee to cover the cost of this AMENDMENT AND RESPONSE. The Commissioner is hereby authorized to charge any additional fees connected with this communication (including any extension of time fees) or credit any overpayment to Deposit Account No. 50-0208.

Respectfully submitted,

MUNCK BUTRUS, P.C.

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